

Algebra 1 SOL A.1
Evaluating Expressions

Name: _____ Date: _____

FOR THIS LESSON, YOU SHOULD ALREADY KNOW:

- The order of operations tells us the order in which to perform operations in an algebraic expression. We use PEMDAS to remember to work in the following order: Parenthesis, Exponents, Multiplication and Division from left to right, and Addition and Subtraction from left to right.
- A square root is any number which when multiplied by itself equals the number. Every perfect square has a positive and negative root. For example, $\sqrt{25}$ is -5 and 5.
- A cube root is any number which when multiplied by itself three times equals the number. For example, $\sqrt[3]{8} = 2$ since $2 \cdot 2 \cdot 2 = 8$
- The absolute value of a number is the distance from 0. For example, $|-5| = 5$.

Steps for Evaluating Expressions

1. Replace variables with given value(s)
2. Simplify using the order of operations

Examples: Evaluate each expression for the given replacement values or set.

1. $n + (13 - n) \div 5$ for $n = 8$

1. Replace n w/ 8

$$8 + (13 - 8) \div 5$$

2. Use Order of Operations to simplify

$$8 + 5 \div 5 \quad \text{parenthesis}$$

$$8 + 1 \quad \text{division}$$

$$\boxed{9} \quad \text{addition}$$

2. $8y - 3x^2 + 2n$ when $x = 5$, $y = 2$, and $n = 3$

$$8(2) - 3(5)^2 + 2(3)$$

$$8(2) - 3(25) + 2(3) \quad \text{exponents}$$

$$16 - 3(25) + 2(3) \quad \text{mult L} \rightarrow \text{R}$$

$$16 - 75 + 2(3) \quad \text{mult L} \rightarrow \text{R}$$

$$16 - 75 + 6 \quad \text{mult L} \rightarrow \text{R}$$

$$-59 + 6 \quad \text{subt L} \rightarrow \text{R}$$

$$\boxed{-53} \quad \text{Add L} \rightarrow \text{R}$$

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3. $\sqrt{2x-y} + z$ when $x = 10$, $y = 4$, and $z = -8$

$$\sqrt{2(10)-4} + (-8)$$

Replace

$$\sqrt{20-4} + (-8)$$

mult under $\sqrt{\quad}$ \leftarrow follows under parenthesis in PEMDAS

$$\sqrt{16} + (-8)$$

sub under $\sqrt{\quad}$

$$4 + -8$$

exponents

$$\boxed{-4}$$

add

4. $5k^3 + mn$ when $k = -4$, $m = 3$, and $n = -5$

$$5(-4)^3 + (3)(-5)$$

Replace

$$5(-64) + (3)(-5)$$

exponents

$$-320 + (3)(-5)$$

mult L \rightarrow R

$$-320 + -15$$

mult L \rightarrow R

$$\boxed{-335}$$

add

5. $\frac{2n+m}{t}$ when $n = -8$, $m = 4$, and $t = 2$

$$\frac{2(-8)+4}{2}$$

replace

$$\frac{-16+4}{2}$$

mult

$$\frac{-12}{2}$$

add

$$\boxed{-6}$$
 divide

6. $|2a^2 - b|$ when $a = -1$ and $b = 13$

$$|2(-1)^2 - 13|$$

$$|2(1) - 13|$$

$$|2 - 13|$$

$$|-11| = \boxed{11}$$

7. $4a^2 + 2a + 2$ when $a = \{-2, -1, 0, 1, 2\}$

$$4(-2)^2 + 2(-2) + 2 = 14$$

$$4(-1)^2 + 2(-1) + 2 = 4$$

$$4(0)^2 + 2(0) + 2 = 2$$

$$4(1)^2 + 2(1) + 2 = 8$$

$$4(2)^2 + 2(2) + 2 = 22$$

$$\{2, 4, 8, 14, 22\}$$